

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

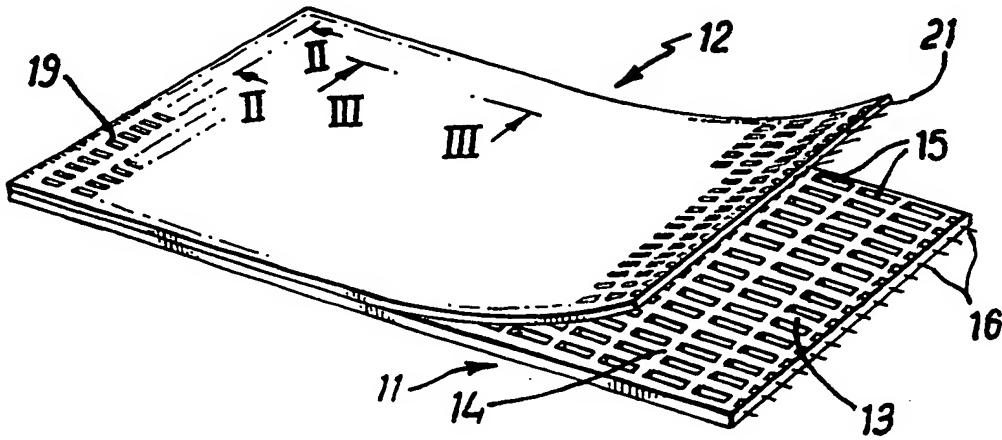
IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 : D21F 7/08, 1/00	A1	(11) International Publication Number: WO 92/17643 (43) International Publication Date: 15 October 1992 (15.10.92)
(21) International Application Number: PCT/GB92/00541		(74) Agents: FUNGE, Harry et al.; M'Caw & Co., 41-51 Royal Exchange, Cross Street, Manchester M2 7BD (GB).
(22) International Filing Date: 24 March 1992 (24.03.92)		
(30) Priority data: 9107166.2 5 April 1991 (05.04.91) GB		(81) Designated States: AT (European patent), AU, BE (European patent), BR, CA, CH (European patent), DE (European patent), DK (European patent), ES (European patent), FI, FR (European patent), GB (European patent), GR (European patent), IT (European patent), JP, KR, LU (European patent), MC (European patent), NL (European patent), SE (European patent), US.
(71) Applicant (for all designated States except US): SCAPA GROUP PLC [GB/GB]; Oakfield House, 93 Preston New Road, Blackburn, Lancashire BB2 6AY (GB).		
(72) Inventors; and		Published
(75) Inventors/Applicants (for US only) : BUCHANAN, Robert, David [GB/US]; 8804 Ross Court, Raleigh, NC 27613 (US). JEFFERY, John [GB/GB]; 65 Royshaw Avenue, Pleckgate Park, Blackburn, Lancashire BB1 8RJ (GB). SAYERS, Ian, Christison [GB/GB]; 30 Chesterbrook, Ribchester, Preston, Lancashire (GB).		With international search report.

(54) Title: PAPERMACHINE CLOTHING



(57) Abstract

A base fabric for use in producing a papermakers fabric is proposed which includes superimposed layers (11, 12) of synthetic thermoplastics material in mesh form, the layers being secured together and at least one layer having load bearing yarns (16, 21) therein. Conveniently two of the superimposed layers (11, 12) have apertures of respective and different sizes, whilst one mesh layer (12) may be cut on the bias with respect to another layer (11) with which it is combined. The base fabric will provide support and reinforcement to a needled mat in producing a papermakers fabric.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	ES	Spain	MG	Madagascar
AU	Australia	FI	Finland	ML	Mali
BB	Barbados	FR	France	MN	Mongolia
BE	Belgium	GA	Gabon	MR	Mauritania
BF	Burkina Faso	GB	United Kingdom	MW	Malawi
BC	Bulgaria	CN	Guinea	NL	Netherlands
BJ	Burkin	CR	Greece	NO	Norway
BR	Brazil	HU	Hungary	PL	Poland
CA	Canada	IT	Italy	RO	Romania
CF	Central African Republic	JP	Japan	RU	Russian Federation
CG	Congo	KP	Democratic People's Republic of Korea	SD	Sudan
CH	Switzerland	KR	Republic of Korea	SE	Sweden
CI	Côte d'Ivoire	LI	Liechtenstein	SN	Senegal
CM	Cameroon	LK	Sri Lanka	SU	Soviet Union
CS	Czechoslovakia	LU	Luxembourg	TD	Chad
DE	Germany	MC	Monaco	TC	Togo
DK	Denmark			US	United States of America

- 1 -

PAPER MACHINE CLOTHING

The invention concerns papermachine clothing, and has particular, though by no means exclusive, reference to clothing for use in the press section of the papermaking machine.

Conventionally, press felts comprise a woven base cloth providing adequate strength in the running direction of the felt and one or more compressible fibre layers applied thereto as, for example, by needling.

Base cloths of the conventional kind are expensive in manufacture and, furthermore, can give rise to the incidence of marking of the paper as it passes through the press section of the papermaking machine due to the presence of knuckles formed at the cross-over points of the warp and weft yarns which form the base cloth.

The primary object of the invention is to provide an alternative to the woven base cloth conventionally used in producing papermachine clothing which avoids, at least in part, the disadvantages inherent in known structures.

According to the present invention there is proposed a non-woven base cloth for use in producing papermachine clothing, the base cloth comprising plural superimposed layers of a synthetic thermoplastics material provided in mesh form, one at least of the mesh layers including load bearing yarns extending in the intended running direction thereof.

- 2 -

Preferably the base cloth includes two layers each of respective and different mesh size.

The invention also includes a papermakers fabric comprising a base fabric as aforesaid in combination with a fibrous batt and/or a finely woven fabric at one face at least thereof and secured thereto.

The invention will now be described further, by way of example only, with reference to the accompanying drawings illustrating several embodiments thereof and in which : -

Fig. 1 is a diagrammatic perspective view of one form of base fabric constructed in accordance with the invention;

Figs. 2 and 3 are enlarged sections taken on lines II-II and III-III, respectively of Fig. 1;

Fig. 4 is a view corresponding to Fig. 1 and shows an alternative relative alignment of the mesh layers of the base fabric; and

Fig. 5 shows, in diagrammatic manner, a typical cross-section through a press felt incorporating the base fabric of the invention.

Referring now to the drawings, and particularly to Fig. 1 thereof, a base fabric for use in the production of a press felt for a papermaking machine comprises a first mesh layer 11 and a second mesh layer 12 secured together in superimposed disposition.

Mesh layer 11 presents longitudinally extending land areas 13 and transversely extending land areas 14, to give

rectangular mesh openings 15 of a first size, land areas 13 including yarns 16 to provide load bearing yarns in the intended running direction of the press felt.

Mesh layer 12 has longitudinally extending land areas 17 and transversely extending land areas 18, the mesh opening 19 also being of rectangular form but being of a second size less than that of the openings 15 of mesh layer 11.

Whilst, in the embodiment under consideration, longitudinal land areas 17 also include reinforcing yarns 21, the presence of such yarns is not essential.

Typically the mesh openings 15 of mesh layer 11 will measure 5mm x 1mm, whilst those of mesh layer 12 will measure 2mm x 0.5 mm, the two layers being 1.5 mm and 1.0 mm thick, respectively, and the upper layer serving to diffuse water present in the fabric and thereby reduce the incidence of shadow marking of the paper sheet. The apertures need not, of course, be of rectangular configuration, and the mesh layer having the larger apertures may lie above or below the other mesh layer as preferred.

The preferred material for the matrix of the mesh layers is thermoplastic polyurethane (typically that sold by B.F. Goodrich under reference 58810), whilst the reinforcing yarns of layers 11 and 12 may comprise any monofilament or multifilament yarn having good bonding characteristics in relation to the matrix material and physical characteristics appropriate to the context, and will typically be of 0.5 mm

- 4 -

and 0.2 mm diameter, respectively.

The mesh layers are conveniently manufactured in accordance with the method described and claimed in GB-A-2202873, although other methods may be preferred, such as, for example, a powder dispersal technique.

The two mesh layers will ordinarily be secured together by thermal fusion of the abutting surfaces in conventional manner. However, it may be preferred, in some instances to join the fabrics by means of an adhesive or by ultrasonic welding or by applying a batt of fibres to the superimposed layers and needling such fibres into and through the layers.

It may be found desirable to provide localised protruberances on the land areas at one or both of the adjacent surfaces of the two mesh layers, to ensure the presence of a fluid flow path in the event that a land area of one mesh layer overlies, and thereby masks, an aperture in the other mesh layer.

In a second embodiment, see now Fig. 4, the longitudinal axis 22 of the mesh openings 19 is inclined with respect to the corresponding axis 23 of openings 15 of mesh 11, the individual mesh layers being of like kind to those shown in Figs. 1 to 3. The preferred angle of inclination shown is 45° as shown, but other bias angles may be used if desired.

The base fabrics as shown in the drawings will be

provided with a fibrous batt of conventional form and materials. The batt may be subjected to pre-consolidation if desired, and is secured to the base fabric by thermal bonding, by an adhesive, ultrasonic welding or by needling. Ordinarily the fibres in the batt will be randomly orientated, but, in some circumstances length orientation may be preferred.

Alternatively, the batt may be built up in situ on the base fabric by means of a melt-blown technique wherein fibres are extruded onto the moving base fabric and, by virtue of their semi-molten state, adhere at their boundary surfaces to the base fabric and/or to any previously applied fibre layer. The degree of fineness of the fibres may be varied during batt build-up according to the specific requirements of the press felt. It is to be appreciated that spun laced, spun bonded or other non-woven web creating techniques may also be used to create the batt.

The press felt as above proposed is of open-ended form and the ends thereof may be joined, for example, by forming loops at the ends of the coarser mesh layer in accordance with the procedures proposed in GB-A-2231838, the loops being intended to receive a pintle wire on interdigititation of loops at the respective ends, the ends of the finer mesh layer being simply brought into abutment. The fibrous batt, whether previously formed or built-up in situ will extend across the line of join and, if necessary, can be

- 6 -

cut transversely of the press felt in register or offset disposition with respect to the line of join, as is proposed, for example, in GB-A-2231529.

It is to be appreciated, however, that the felt may be of endless form.

As the base fabric as hereinbefore described is devoid of knuckles at the mesh/batt interface, the weight of batt applied may be reduced as compared with that necessary to avoid the incidence of marking in the context of a fabric embodying a woven base.

However, there are circumstances wherein controlled marking is desirable, and in these circumstances the surface of the overlying mesh could be of ribbed configuration, as would be the case if the base fabric were to be embodied in a marking felt. In the case of a felt for use in the fibre/asbestos cement industry the overlying mesh would be formed with knuckles, (and if required ribs,) to provide localised pressure points to encourage bonding between the successive fibre cement layers.

Claims

1. A non-woven base cloth for use in producing papermachine clothing, the said base cloth comprising plural superimposed layers of a synthetic thermoplastics material provided in mesh form, one at least of the mesh layers including load bearing yarns extending in the intended running direction thereof.
2. A non-woven base cloth as claimed in claim 1, wherein said base cloth includes two layers each of respective and different mesh size.
3. A non-woven base cloth as claimed in claim 1 or 2, wherein each mesh layer includes load bearing yarns extending in the intended running direction thereof.
4. A non-woven base cloth as claimed in any one of the preceding claims, wherein the apertures in each mesh layer are of rectangular configuration.
5. A non-woven base cloth as claimed in any one of the preceding claims, wherein the apertures in one mesh layer define spaced parallel ribs extending in the intended running direction of the fabric, there being load bearing yarns encapsulated within said ribs.
6. A non-woven base cloth as claimed in claim 5, including a superimposed mesh layer wherein the apertures therein define spaced parallel ribs inclined with respect to the yarn carrying ribs of the said one mesh layer.
7. A non-woven base cloth as claimed in claim 6, wherein

- 8 -

the ribs of the said one mesh layer and those of the said superimposed mesh layer are inclined at an angle of 45°.

8. A non-woven base cloth as claimed in any one of the preceding claims of endless form.

9. A non-woven base cloth as claimed in any one of claims 1 to 7, further including loops at the respective ends thereof, the said loops being provided at the ends of a mesh layer having load bearing yarns.

10. A non-woven base cloth as claimed in any one of the preceding claims, wherein the mesh layers are secured together in superimposed disposition.

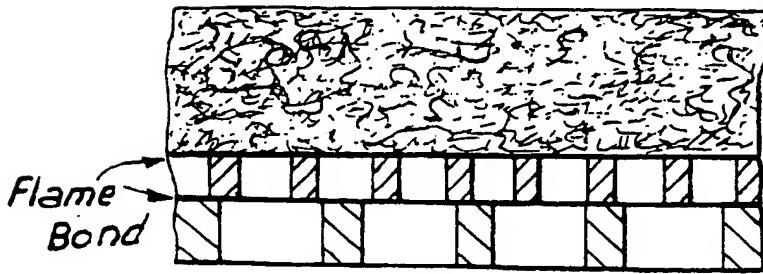
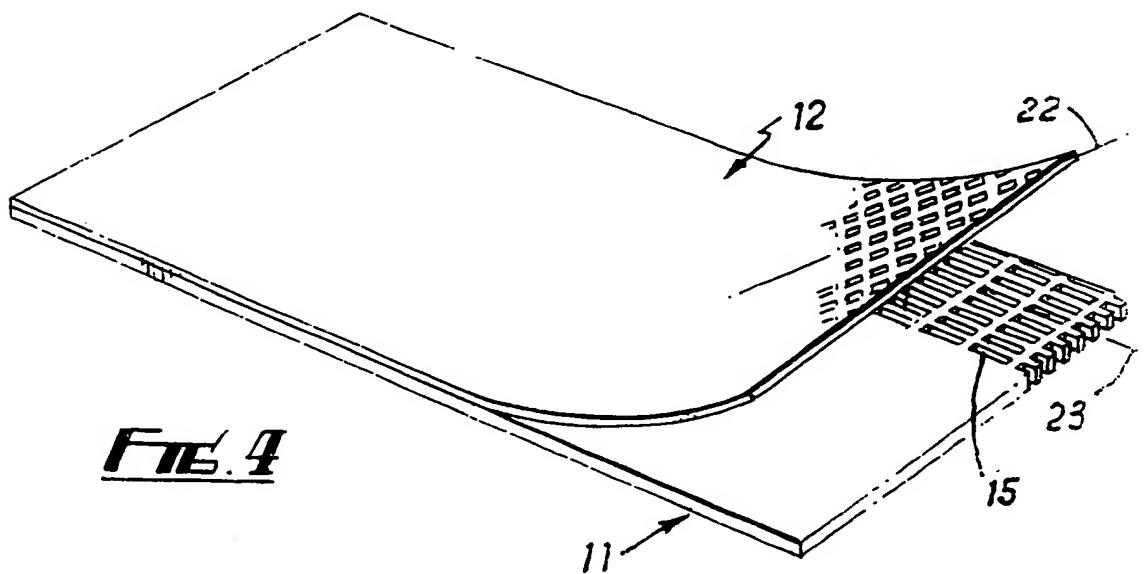
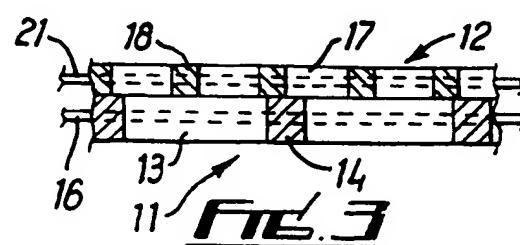
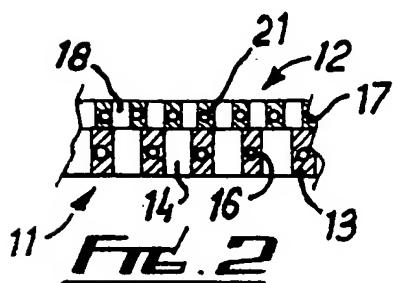
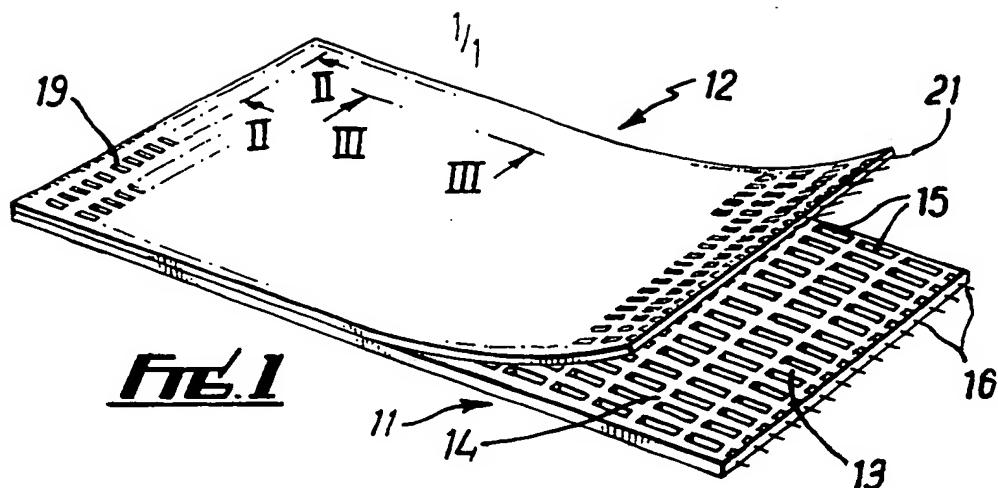
11. A non-woven base cloth as claimed in claim 10, further including a batt of fibres needled to the layers thereby to secure said layers together.

12. A non-woven base cloth as claimed in any one of the preceding claims, in combination with a fibrous mat secured thereto at one face thereof.

13. A non-woven base cloth as claimed in claim 12, wherein the surface of that mesh layer adjacent the fibrous mat is of profiled form.

14. A non-woven base cloth as claimed in claim 13, wherein the profiled form of the surface of the mesh layer adjacent the fibrous mat includes upstanding ribs.

15. A papermakers fabric including a base cloth as claimed in any one of the preceding claims.



— Needled Mat

— Fine Mesh

— Coarse Mesh

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all)⁶

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.C1. 5 D21F7/08; D21F1/00

II. FIELDS SEARCHED

Minimum Documentation Searched⁷

Classification System	Classification Symbols
Int.C1. 5	D21F

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched⁸III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹

Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	US,A,4 541 895 (ALBERT) 17 September 1985 see the whole document	1-3,5,8, 10,12-14
A	---	11
X	DE,A,3 444 082 (KUFFERATH) 7 August 1986 see the whole document	1,2,4-6, 10,12
A	---	11
A	EP,A,0 307 182 (ASTEN GROUP) 15 March 1989 see the whole document	1,2,4, 10-12
A	WO,A,9 102 642 (HUYCK CORPORATION) 7 March 1991 see the whole document	1,3
	---	-/-

¹⁰ Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

¹¹ "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention¹² "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step¹³ "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.¹⁴ "&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search

Date of Mailing of this International Search Report

1

19 JUNE 1992

30 JUN 1992

International Searching Authority

Signature of Authorized Officer

EUROPEAN PATENT OFFICE

DE RIJCK F.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	GB,A,2 231 838 (SCAPA GROUP) 28 November 1990 cited in the application see the whole document -----	9

ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. GB 9200541
SA 57801

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information. 19/06/92

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US-A-4541895	17-09-85	CA-A-	1230511	22-12-87
DE-A-3444082	07-08-86	None		
EP-A-0307182	15-03-89	US-A- DE-A-	4830915 3866195	16-05-89 19-12-91
WO-A-9102642	07-03-91	AU-A-	5735390	03-04-91
GB-A-2231838	28-11-90	AU-A- EP-A- JP-A-	5489790 0399674 3064592	15-11-90 28-11-90 19-03-91